Staff Report on:

OUT-OF-STATE COAL-FIRED POWER PLANTS: TRENDS AND RESTRUCTURING IMPLICATIONS

Keith Golden

Environmental Protection Office
Energy Facilities Siting and Environmental Protection Division
California Energy Commission

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Table of Contents

INTRODUCTION

In order to respond to a portion of the ***ER 96*** Issues Order, the Implications of Electricity Industry Restructuring, Environmental Effects, we review in this paper the current emission control technologies, emission control levels, federal and state regulations for new and existing coal-fired power plants out-of-state, and the likely trends for these in the 5 and 12 year horizons. In particular this paper addresses issue I.C.4., "(a)re the implementing strategies for existing environmental regulation [out-of-state] related to power plant emissions appropriate for a more competitive electricity market?"

Many of the coal-fired generation units that are currently operating in the West were built at a time when very few air pollution regulatory programs were in existence. As a result, a number of operating power plants were built before ambient air quality standards were set. Some of these power plants are virtually uncontrolled, but through programs such as the Federal Clean Air Act visibility program and the Title IV Acid Rain program, these units' emissions are gradually, one-by-one being controlled. The following paragraphs discuss the current regulatory environment and the possible changes to these units' emissions levels (in a qualitative way) over the next decade or so, and the effect of these changes on restructuring of the California electricity market.

EXISTING REGULATORY REGIME

New Source Performance Standards (NSPS)

The federal NSPS for electric utility steam generating units cover two different time frames. 40 CFR 60, Subpart D applies to units that commenced construction after August 17, 1971. The SO_2 limit for units greater than 73 MW (250 mmBtu/hr) is 1.2 lb SO_2/mmBtu heat input. 40 CFR 60, Subpart Da applies to units that commenced construction after September 18, 1978. Again, for units greater than 73 MW (250 mmBtu/hr), the limits are 1.2 lb SO_2/mmBtu and 90% SO_2 reduction or 0.6 lb SO_2/mmBtu and 70% SO_2 reduction. These standards are based on a 30-day rolling average (CFR 1995). There could be emission excesses of these standards for hours or even days that must be made up with lower emissions over a 30-day time span so that the rolling average standard is not exceeded. A number of coal-fired units that commenced construction prior to 1971 in the West would be exempt from NSPS requirements. However, power plants that do not need to comply with NSPS requirements may cause possible visibility impacts to Class I areas, and therefore be subject to the visibility requirements discussed below.

SO_2 Attainment Plans

Arizona

There are six counties in southern Arizona that are designated non-attainment for the Federal SO_2 standards. The causes of the violations in all areas can be traced to ore smelter operations. Smelters in three of the areas have already been shut down and are being dismantled. In the other three non-attainment areas, stack emissions are already being controlled, and existing fugitive SO_2 sources are now being investigated for further control. No existing power plants have been identified for further control as part of the control strategies of the attainment plans (Gibbs 1996).

Montana

There are two areas in Montana that are designated non-attainment for the federal SO_2 standards. The control strategies predominately target smelters, although one coal-fired power plant, the Corette plant, has been identified for SO_2 controls (Ostrand 1996). That plant is required to reduce its SO_2 emissions by 1998, however, the owners decided to switch to a lower sulfur coal, and the plant is already complying with the lower SO_2 emission levels. No additional controls for existing facilities will be necessary (Coefield 1996).

New Mexico

A small portion of southwest New Mexico is classified as non-attainment for the federal SO_2 standards. The violations were apparently due to a smelter operation, however, in the last few years there have been no violations of the SO_2 standards. The state is now considering a proposal to EPA that the area be designated as attainment for SO_2 (Nelison 1996).

Utah

There is one area in western Utah that is designated non-attainment for SO_2. The copper smelter in the area has been identified as the responsible source, with an approved attainment strategy now in place. No existing power plants in Utah are specified for additional controls to reach attainment of the SO_2 standards (Ostrand 1996).

Section 169(A), Clean Air Act

The 1977 Amendments to the Clean Air Act established a national goal of "the prevention of any future and the remedying of any existing impairment of visibility in mandatory Class I Federal areas, which impairment results from man-made air pollution." The basic tenet of the requirements of Section 169(A) is that if the state or Federal Land Manager (FLM), such as the Department of Interior or Department of Agriculture, determines that there may be

visibility impairment in a Class I area, the state and the FLM would then identify the suspected sources of the visibility impairment. Then, after considerable dialogue and study with the owners of the suspected source(s), the state would recommend the appropriate best available retrofit technology (BART) and a schedule for implementing the controls.

The most notable example of the implementation of Section 169(A), was the analysis of the Navajo Generating Station's (near Page, Arizona) SO_2 emissions impacting visibility in Grand Canyon National Park. After lengthy discussions and studies among the project owners, consultants, EPA, the Park Service, the State of Arizona, and environmental groups, an agreement was reached to install SO_2 scrubbers, to become operational in 1997.

The state and federal governments, under Section 169(A), are presently looking at three other coal-fired units, the Centralia plant in Washington, the Mohave plant in Nevada, and the Hayden plant in Colorado, for possible visibility impacts on Class I areas (PAC 1996)(Shaver 1996). The Public Service Company of Colorado has recently agreed to either install SO_2 and NOx controls by the year 1999 on their Hayden plant or convert the power plant to natural gas firing (WES 1996).

State Programs

Most of the western states have adopted emission limitations for SO_2, usually expressed in lbs of SO_2/mmBtu for coal-fired utility boilers. Most of these limits are either at the NSPS level (1.2 lb/mmBtu) or slightly below, ranging from 0.8 lb/mmBtu to 1.0 lb/mmBtu. Wyoming has the most stringent requirements (excluding California), especially for units built after 1984, with an emission limit of 0.2 lb/mmBtu (30 day average) and a concurrent 0.45 lb/mmBtu averaged over 3 hours (Loeb et al 1995).

1990 Clean Air Act Amendments - Title IV, Acid Rain

Because of the concern over the acid rain phenomenon, especially on the East Coast of the United States, the 1990 CAA Amendments included provisions for controlling SO_2 and NO_x emissions from existing coal-fired units.

Sulfur Dioxide

Emissions of SO_2 would be reduced in two increments. The first increment, called Phase I, targets 111 specific units, all on the East Coast, to reduce their SO_2 emission rate to less than 2.5 lbs/mmBtu between the years of 1996 and 1999. None of the coal plants in the western U.S. are affected by Phase I because all the western coal plants are operating below the 2.5 lbs/mmBtu threshold. The second increment, Phase II, goes into effect in the year 2000, and

sets a limit of 1.2 lbs/mmBtu (Quarles et al 1990). Staff has identified two power plants (Naughton in Wyoming and Centralia in Washington) that could be affected by the Phase II requirements. Most of the western coal plants currently operate below the limits set by the Title IV SO_2 requirements because western coal has a lower sulfur content, and approximately two-thirds of the coal-fired capacity in the western U.S. has some form of flue gas desulfurization control. Thus, most of the western plants will not be affected by the SO_2 portion of the Title IV requirements.

The national SO_2 reductions are expected to total approximately 10 million tons annually. A unique aspect of the program is that the emissions reductions are to occur through a market-based system. EPA allocates emission allowances to individual power plants; operators or utilities then decide to reduce their own emissions or acquire emission allowances from other power plant operators to cover their facility emissions. Surplus allowances are achieved by over-controlling unit(s), thus generating allowances to be made available on the market.

Nitrogen Dioxide

The NO_x portion of the Title IV requirements is also a two tier control program, with limits applicable by 1995 and 2000. Many of the western coal-fired boilers will be affected by the standards set for 2000. Low NO_x burners will be the most likely method of control.

The Grand Canyon Visibility Transport Commission

The 1990 Amendments to the Clean Air Act added Section 169(B), which established the Grand Canyon Visibility Transport Commission (GCVTC). The purpose of the GCVTC is to analyze the causes of regional haze problems that adversely affect sixteen Class I areas (National Parks, Wildlife Refuges and Wilderness Areas) in the states of Utah, Colorado, New Mexico and Arizona (known as the Colorado Plateau). Since the visibility problem that impacts the Colorado Plateau can originate from sources throughout the western states, the Commission includes representatives of the following western states: California, Oregon, Nevada, Utah, Wyoming, Colorado, New Mexico and Arizona.

The Commission is scheduled to recommend to EPA in June, 1996 the necessary measures, if any, that need to be implemented to remedy the visibility impairment on the Colorado Plateau.

The GCVTC is organized around a number of committees that provide organizational, technical, policy, regulatory, and public input into the GCVTC recommendations. The final recommendations to the GCVTC are encompassed in a report issued by the Public Advisory Committee (PAC) to the GCVTC in May, 1996 entitled, "Proposed Recommendations of the Grand Canyon Visibility Transport Commission".

GCVTC's Public Advisory Committee Recommendations

The PAC proposed a number of recommendations concerning stationary sources that could impact the Colorado Plateau's national parks and wilderness areas.

There are three species of pollutants from stationary sources that impact visibility in the region: sulfates, nitrates and organic compounds. The most significant contributor to visibility impairment is sulfates, which is formed in the atmosphere in conjunction with sulfur dioxide (SO_2), which is a major criteria pollutant produced by coal-fired power plants.

The PAC recommends no specific new actions before the year 2000, and instead relies on the existing regulatory programs to reduce SO_2 emissions in the region (PAC 1996). The existing regulatory scheme includes the three pollutants discussed above; attainment plans for those states that are designated non-attainment for the federal SO_2 standard; the Title IV (Acid Rain) requirements of the 1990 Clean Air Act Amendments; and the on-going source visibility impact attribution studies under the requirements of Section 169(A) of the Clean Air Act.

The PAC recommends that prior to 2000, the states and tribes undertake studies of uncontrolled sources, on Class I areas, and determine whether emissions reductions will be required (PAC 1996). This work would likely be similar to the Navajo Generating Station visibility impacts analysis for the Grand Canyon and the eventual SO_2 emissions control of that source. The PAC also recommends that SO_2 emissions targets be established, with the eventual goal of a 50 to 70% SO_2 emissions reduction by the year 2040. Interim targets, at five year intervals, would be assessed to insure steady progress in SO_2 reduction. If the interim goals are not achieved, then a regulatory program would be implemented, probably an emissions cap or incentive-based market trading system. If the interim emission reduction targets are met, and certain sources go beyond compliance or achieve early reductions, then those sources would be rewarded for the actions, through exemptions from future target requirements and the banking of offset credits (PAC 1996).

The PAC also recommends that the EPA source attribution study on the Mohave Power Plant in southern Nevada be completed within one year, and that EPA take action consistent with the results of the study within one year after the completion of the study.

Finally, the PAC recommends that additional visibility monitoring data be gathered, and that a more accurate emissions inventory be developed. In addition, an accurate and credible emissions accounting system needs to be developed to measure the effectiveness of emission reduction goals and emission caps (PAC 1996).

OUT-OF-STATE POWER PLANT IMPLICATIONS

1996-2000 Time Frame

Between now and 2000, there are a number of current regulatory programs that could affect the emissions of existing coal-fired generation in the western U.S.

There is only one coal-fired power plant, the Corette plant in Montana, that is affected by a state's SO_2 attainment plan control measure strategy. By switching to a lower sulfur coal, which already meets the SO_2 level necessary for compliance, the power plant has met the SO_2 attainment plan requirements. There are no other attainment plan strategies that include power plants during the 1996 through 2000 time frame. Further, the regulatory programs should not constrain these power plants to operate at higher levels since the applicable emission limitations control the rate of emissions (lbs SO_x/mmBtu fuel) and not the total quantity of emissions (tons SO_x/year).

In addition to the attainment plans, there are continuing emissions reduction efforts under Section 169(A) of the Clean Air Act. The SO_2 scrubbers at Navajo will go into operation in 1997. The Centralia power plant visibility impact investigation will continue. If the Navajo experience could be used as a benchmark, it could be many years, probably after the year 2000, before any SO_2 controls would be applied to the Centralia power plant. If the recommendation of the Public Advisory Committee of the GCVTC for an expedited analysis of the Mohave power plant is adopted, then a requirement for controlling the emissions from that facility (if the study supports such an action) could be forthcoming by 1998. In that event, emission controls could be installed by around 2000 or soon thereafter. The Hayden facility will be controlled by the year 1999 or be converted to natural gas firing.

The Title IV requirements for SO_2 reductions will have minimal impacts on the coal-fired generation in the West, but the NO_x control portion of Title IV will have a much more significant effect. By the year 2000, a number of coal-fired units in the West will need to be retrofitted with controls, most likely low-NO_x burners, to comply with the May 2000 deadline.

Based on the initial recommendations of the Public Advisory Committee of the GCVTC, it is unlikely that any additional controls as a direct result of its work will be applied before the year 2000. If the recommendation that states and tribes investigate other stationary sources that could impact Class I areas is adopted by the GCVTC, then those studies will undoubtedly take many years. If the investigations show that additional controls will be necessary at individual units, those controls will probably not be applied until well after 2000, and will not significantly affect the availability, reliability and cost of the aggregate out-of-state coal-fired generating capacity.

2001-2007 Time Frame

There are no SO_2 control measures in present attainment plans that will go into effect during the 2001 through 2007 time frame.

If the Centralia and Mohave studies reach a conclusion that some level of control is necessary to reduce visibility impacts, then it is likely that actual SO_2 controls would be installed sometime during this time frame. Based on the discussion above concerning the states and tribes identifying specific sources that could impact Class I areas, it is conceivable that some sources could be identified for control. Of course, at this time, the sources that might be targeted are not known. Given the length of time of the studies and debate concerning the Navajo Generating Station and its impacts, actual controls on the currently unspecified units would probably not occur until after 2007.

If the GCVTC recommendation for an incentive-based trading program is necessary, it is likely that some form of SO_2 control(s) would be applied to some of the existing units in the western states. Of course, at this time, there are no details of this regulatory program, so knowing which units would be affected and where they are located is not possible. Therefore, any judgements at this time regarding the possible ramifications of the trading program on the aggregate out-of-state coal plant would be speculative.

Since the last Title IV program target date is 2000, all controls for both NO_x and SO_2 to meet compliance with Title IV will have been in place prior to 2001. Based on this assumption, there should be no ramifications of the Title IV program on the aggregate coal-fired system during this time frame.

If new generation is planned and operated outside of California during this time frame, it will likely be gas-fired with possibly some coal-fired generation. Those projects that emit greater than 100 tons of any pollutant would be subject to federal Prevention of Significant Deterioration (PSD) analysis. The most significant components of a PSD analysis are the application of Best Available Control Technology (BACT), an air quality impact assessment, and the analysis of the project's impacts on Class I areas, including a visibility analysis. These analyses should not create a significant constraint as long as the proposed projects are well thought-out, designed with up-to-date technology, and located at sites with a consideration of their potential impacts on Class I areas. None of the ongoing studies and federal regulations (CAA and Title IV) should impose a regulatory barrier to the construction and operation of new gas or coal-fired power plants out-of-state to supply power to California.

CONCLUSIONS

In the near term (1996 through 2000), the Navajo, Hayden and Corette plants will be required to control SO_2 emissions, and a number of units (although not specifically identified) will need to control NO_x emissions because of Title IV Acid Rain. In the longer term (2001 through 2007), other units, such as Centralia and Mohave, , may be controlled, with additional power plants perhaps identified for control later in the first decade of the century. Other power plants could be controlled, either by the requirements of Section 169(A) of the Clean Air Act, or through a regulatory program identified by the GCVTC. Of course, at this juncture, it is unknown as to what sources would be controlled, or their level of control.

The units subject to emissions controls, and the additional limited potential units subject to new emission controls, should not have a significant affect on the cost of power from the aggregate out-of-state power generation system. The out-of-state system should be able to supply power to California, if competitive, without any new cost, availability, and reliability barriers being imposed due to air quality regulations. Our conclusions above are based on an evaluation of the air regulatory regime on the aggregate coal-fired system. However, if a power broker were to negotiate a power purchase deal with the owners of one of few power plants mentioned above for possible control (i.e. Mohave, Centralia or Hayden) then the cost of that power may be different (probably higher) to reflect the cost of controls.

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